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CHINA REPORT

SCIENCE AND TECHNOLOGY

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MAN-MADE EARTHQUAKE EXPERIMENT IN BOHAI CALLED SUCCESS

Beijing BEIJING RIBAO in Chinese 19 Sep 81 p 1

[Article by Yin Xiwei [3009 1585 1218] and Liang Zhongyong [2733 0022 3938]: "China's First Man-made Earthquake Experiment in Bohai Is a Success"]

[Text] China's first man-made earthquake experiment at sea was conducted by the Geophysical Survey Brigade of the State Seismological Bureau at the Beijing-Tianjin-Tangshan earthquake forecast experimental field. The explosion was successfully detonated at 0000 hours on 18 August 1981, the expected goals were achieved and the experiment has opened up a new avenue for China's earthquake research.

In the past China has conducted a number of man-made earthquake tests on land and obtained definitive results. In order to carry out explorations in a broader realm, improve the accuracy of China's earthquake prediction and forecast, monitor the earthquake activities in the Beijing-Tianjin-Tangshan area more closely, study the characteristics of the crust structure and deep earthquake sources of this area and the surrounding area, and to investigate the correlation between earthquake activity and the local variation of earthquake wave velocity in the deep crust, the State Seismological Bureau established the Beijing-Tianjin-Tangshan earthquake science research and experiment ground. Using this testing ground, special-topic studies on crust structure and earthquake activity regularity of the Beijing-Tianjin-Tangshan area were conducted to improve forecast and protect the safety of the capital and the Beijing-Tianjin-Tangshan area. The man-made earthquake in Bohai is one of the principal scientific research projects of the Beijing-Tianjin-Tangshan experimental field.

The experiment in Bohai was conducted 20 meters under water at 38°50' latitude and 118°47' longitude and it is a large scale ton-level combination explosion. The on-land monitoring work was performed by more than 100 earthquake stations and mobile stations in Henan, Hebei, Shandong, Shanxi, Liaoning, Beijing and Tianjin. These stations formed a network and covered a region 500 kilometers in radius and 8 million square kilometers in area. It is a scientific experiment of a large scale.

Based on the obtained data, analysis and evaluation have confirmed that this explosion experiment is a success. It took more than 4 months from design to explosion. The experiment received great attention of the State Seismological Bureau and the leadership that participated in the activity. All the scientific and technical staff took charge

in reducing the expenditures in the design and the actual operation of the experiment and decreased the total expense below the original budget by 20 percent. The comrades working at sea endured the hardship of seasickness and vomiting, worked continuously for 60 hours in wind and rain and actively contributed to the success of the experimental explosion.

This man-made earthquake at sea has also provided important data for deep crust exploration technique in the coastal area and on the propagation curve of earthquake waves. It served as an experimental basis for man-made earthquake detection at sea.

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CSO: 4008/7

AUTOMATIC DIGITAL PRECISION LASER RANGEFINDER DEVELOPED

Beijing RENMIN RIBAO in Chinese, 6 Aug 81 p 3

[Article by Yu Feng [0060 7685] and Zheng Feng [2973 1496]: "Our Nation Successfully Develops An Automatic Digital Long-Range Precision Laser Rangefinder"]

[Text] The JCY-3 model precision laser rangefinder successfully developed by the Earthquake Research Institute of the State Seismological Bureau (originally the Wulan Earthquake Brigade) has passed technical evaluation after over 4 months of field tests.

The accurate distance measurements have important and broad uses in national defense and economic construction and in judging deformation and shifts of the earth's crust and similar scientific research and engineering surveying. This automatic digital long-range precision laser rangefinder developed by the Earthquake Research Institute is small; it has a long range (50 kilometers), high precision and automatic measurement. It is an indispensable instrument in measuring precise distances. For example, in earthquake deformation, the earth's crust undergoes different deformations before and after the earthquake. Through this instrument, we can know the changes in the distance between two fixed points of the earthquake region at any time as a reference for seismic forecasting. The application of this instrument is broad and the need is great.

This instrument that has been successfully developed by our nation has been evaluated by over 50 professors and experts of the State Surveying and Cartography Bureau and seismology departments. They believe the instrument has good properties and that production in batches should be quickly organized.

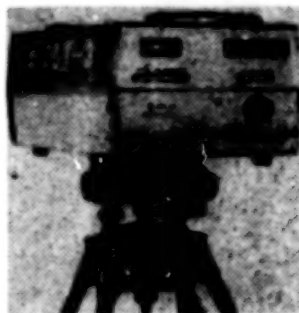


Photo shows mainframe of the rangefinder.

DEEP-CRUST GEOLOGICAL STRUCTURES IN CHINA DESCRIBED

Beijing WUTAN YU HUATAN [GEOPHYSICAL AND GEOCHEMICAL EXPLORATION] in Chinese Vol 5, No 4, Aug 81 pp 193-204, 220

[Article by Wang Maoji [3769 2021 1015], Cheng Jiayin [4453 1367 0603] and Cheng Zhenyan [4453 2182 3508]: "The Regional Features of Deep-Crust Structures in China"]

[Excerpts] Based on the statistical relationship between the average Bouguer gravity anomaly and the known depth of the Mohorovicic discontinuity [M-discontinuity], we have determined the variations of crust thickness in China and proposed deep-crust structural zones. Using the correlation between gravity anomaly and topographic height, we analyzed the crust isostasy and the isostatic mechanism and thereby inferred to the crust structure. Based on isostatic conditions, the lateral variations of the average density of the upper mantle were estimated using crustal mass variations computed from seismic and gravitational data. Because deep-crust geological data on China is very sparse, the conclusions proposed here are preliminary, and they should be modified and supplemented after more geophysical data are accumulated in the future.

I. Crust thickness and deep-crust structural zones

The M-discontinuity is the boundary between the crust and the upper mantle, and is a major boundary in density. Using seismic data, the M-discontinuity can be accurately measured, and from it the variations in crust thickness can be determined. In the absence of sufficient seismic data, the M-discontinuity can be computed from Bouguer anomaly based on the correlation between Bouguer anomaly and M-discontinuity under isostatic conditions, and using seismic data as constraints. However, the isostasy mechanism is very complex; it depends not only on the variation of crust thickness, the variation of the mantle density may also be an important factor of the isostatic compensation. Local Bouguer anomalies may only partially reflect, or may not reflect at all, the variations in crust thickness. As a result, definitive relationships often do not exist among Bouguer anomaly, topographic height, and M-discontinuity. Large errors are often produced when M-discontinuity is inferred from Bouguer anomaly alone. Nonetheless, a linear relationship usually exists between the average Bouguer anomaly over a certain area and the average M-discontinuity. This is because regional isostasy can only be achieved over an area, and the regional variation of the crust density is rather gradual.

II. Crust isostatic characteristics

Local variations of the free-air anomaly are an indication of crustal non-isostasy, and variations in crust and mantle composition may also lead to free-air anomaly. For low and gradual topography over a large area, the magnitude and sign of the free-air anomaly and the isostatic anomaly are often very close, both having average values that approach zero; the free-air anomaly can be used for the case in place of isostatic anomaly. For complex and changing topography, the free-air anomaly is often directly related to the topography, and the anomaly is positive on the mountain peak and negative in the valley. This behavior also exists to a certain degree in isostatic anomaly, but its variation is smaller than that of the free-air anomaly. Before a national isostatic anomaly is compiled, crust isostasy can be studied using Bouguer anomaly and free-air anomaly.

1. Characteristics of $1^\circ \times 1^\circ$ free-air anomalies in China

Using $1^\circ \times 1^\circ$ average Bouguer anomaly and average elevation data, we have compiled a national map for $1^\circ \times 1^\circ$ free-air anomalies in China (see Figure 2). Local variations of the surface layer mass have already been subtracted from the gravity, judging from the trend of variation in the free-air anomaly, the anomaly field can be divided into two distinctly different parts east and west of 104°E . In the western part, the anomalies run west northwest-east west, and the amplitude and gradient are both large--from $+170$ mgal to -140 mgal. In the eastern part, the anomalies run north northeast-south north, and the amplitude and gradient of the anomalies are both small; the amplitude variation is ± 30 mgal. East of 113°E , the anomaly is basically positive. In the western part, the free-air anomaly is closely related to the elevation: the major mountain ranges (such as Himalayas, Kunlun, Aierjin, and Tianshan) have strongly positive anomalies, and sedimentation basins (such as Tarim, Qaidam, and Junggar) have strongly negative anomalies. The anomaly on the Qinghai-Tibet Plateau is positive. In the eastern part of China, the relationship between the free-air anomaly and the elevation is not pronounced; for example, no pronounced effects exist in mountain ranges such as Dahingganling (900 meters), Yinshan (1,500 meters), Qinling (1,100 meters), and Nanling (400 meters) and in some sedimentation basins. This distribution of the free-air anomalies reflects the different isostatic conditions of land masses at different locations and the deep-crust earth structure.

2. Correlation between gravity anomaly and topographic height

According to the isostatic theory, the correlation between Bouguer anomaly and height can be used directly in the interpretation of the crust isostatic compensation; the stronger the correlation, the more complete the compensation. A relationship exists between the free-air anomaly and the elevation of the measurement point; isostatic compensation can also be estimated based on this relationship. The two principal parameters in isostatic compensation are the depth of compensation and the strength of the lithosphere. The depth of compensation is approximately proportional to the regression coefficient of the free-air anomaly with respect to height, while the lithospheric strength determines the minimum area for complete isostatic compensation, which is proportional

to the mean square deviation from the line of regression. Because a small regression coefficient indicates there is no increase in average crust density under the mountain ranges, compensation can be realized at a shallow depth (at the bottom of the crust). A large regression coefficient indicates that there is an increase in the average density under the mountain ranges and that compensation can be realized at a greater depth (in the mantle).

III. Lateral variation of crust density

Regional Bouguer anomalies are usually caused by the deep mass variation of the compensated topography. The variation in compensation mass reflects not only variations in crust thickness but also variations in crust and mantle density. The crust thickness can be computed from Bouguer anomaly under isostatic conditions. When the gravity anomaly caused by changes in crust thickness does not agree with the observed anomaly, the residual anomaly reflects variations in the density of the crust and the density of the mantle. Assuming the density of the mantle remains constant, variations in the density of the crust can be calculated. Similarly, variations in mantle density can be calculated if the crust density is assumed to be a constant.

IV. Estimate the lateral variation of upper mantle density from variation in crustal mass

Assuming that compensation takes place at the M-discontinuity, we have calculated the variation in crust density in the last section by using the isostasy principle. Lateral density variations in the crust and in the mantle can also be estimated from the free-air anomaly; however, because anomaly sources at different depths cannot be distinguished uniquely, and because the depth of compensation cannot be determined, the usefulness of calculating the crustal and mantle density variation from gravity anomaly alone is limited. The method proposed here for calculating the upper mantle density variation uses composite seismic and gravitational data in computing the variation in crustal mass and then estimates the lateral variation of upper mantle density based on the variation in crustal mass; it does not involve the depth of compensation.

V. Conclusions

Based on the analysis results given above, the following conclusions can be made about the deep-crust structure in China:

1. The trend of crust thickness variation in China shows an increase in thickness from east to west. The depth of the M-discontinuity varies from 34 kilometers in the eastern coast to 68 kilometers on the Qinghai Plateau. Going from east to west, a pronounced change in the M-discontinuity depth occurs after two major gravity-step belts. These two gravity steps coincide roughly with the two steps in surface elevation, which increases from east to west.
2. Based on the characteristics of the depth variation of the M-discontinuity, the crust can be divided into two mantle-slope belts, three mantle-terrace regions, and a complex structure region which can be further divided into nine secondary and primary mantle humps and depressions.



Figure 1. Depth and Structural Zones of Mohorovičić Discontinuity in China



Figure 2. China's 1° x 1° Free Air Anomaly

3. The continental crust of China is basically in a state of regional isostatic equilibrium. The lithospheric strength and isostasy area in the east are smaller than those at the west; therefore, the $1^{\circ} \times 1^{\circ}$ area isostasy of the east is higher than that of the west. Large deviations from local isostasy occur in the Himalayas and nearby regions.

4. The east-west structural belt of Yinshan, Qinling, and Nanling is close to a complete isostatic compensation. Because of the strong influence of the north-northeast structure belt, the east-west structure belt does not show up pronouncedly in the gravitational field.

5. The Qinghai-Tibet Plateau is an independent structural unit with thick crust and high upper mantle density. The Himalaya Mountains rose because of the collision and compression between the India plate and the Eurasia plate. Due to the action of the plate movement, the Himalayas have not reached isostatic equilibrium and have large residual masses. Strong free-air anomaly indicates intense activities in this structural zone.

6. The gravitational and isostatic characteristics in eastern and western China are noticeably different, indicating two different crust bodies whose boundary approximately coincides with the north-south seismic belt. The West Kunlun-Aerjin deep break divides the western crust into the Qinghai-Tibet crust and the northwest crust, with a pronounced difference in crust thicknesses. Along the borders of the plate, there are large deviations from isostatic equilibrium.

7. We have made preliminary estimates of the lateral variations of the crust density and the upper mantle density. The range of variation of the average density is only a few percentage points, and is a mirror image of the crust thickness. The trend of the mantle density decreases from the east to the central region and then increases toward the direction of Tibet. The Tibet Plateau is a region of local maximum in mantle density.

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CSO: 4008/2

SIMPLE ERTS PHOTOGRAPH DIFFERENTIATION METHOD DESCRIBED

Shanghai JIGUANG: [LASER JOURNAL] in Chinese Vol 7 No 10, Oct 81 pp 32-34

[Article by Huang Letian [7806 2867 1131], Wang Tianji [3769 1131 0644], Lin Shiyong [2651 0099 5391], Zhang Shichao [1728 0013 6389] of the Guangzhou Institute of Electronic Technology of the Chinese Academy of Sciences; "A Simple Way To Detect the Difference Between Two Photographs Taken by the Satellite ERTS." This article was received on 15 October 1979.]

[Text! Abstract: This article proposes a new method of detecting the difference between two photographs--the speckle image modulated by white light is regarded as the random carrier wave during optical information processing. Experiment proves this method will also effectively produce a high redundancy to code information of images. The results obtained are similar to those obtained by the method of using coherent light modulated speckle patterns proposed by Francon et al. But the method proposed here is simpler.

The procedures of the ordinary method of processing of optical information by the method of image frequency spectral subtraction is relatively complicated. In 1974, Francon proposed the use of modulated speckle patterns as the random carrier bodies to process optical information in detecting differences between two photographs⁽¹⁾, thus simplifying the procedures of the ordinary method of processing optical information by the method of image frequency spectral subtraction. He successfully detected the differences between two photographs of the earth's surface taken at two different instants by the ERTS satellite.

The method proposed and the experiment described in this article are improvements of the method by Francon using coherent light modulated speckle patterns. Using white light patterns in processing further simplifies the procedures of the method of Francon.

Let the same parts of two photographs be designated by A, and the different parts be designated by B and C. First place the first photograph (A + B) over a photographic film P and expose it to white light. Then, place the second photograph (A + C) over the original position of the first photograph and translate the position of the film already exposed to (A + B) along the direction perpendicular to the ξ axis of the incident light to ξ_0 , the magnitude of

ξ_0 is several dozen microns, then use white light for a second exposure. Thus, the total recording on the film P by the two exposure can be written as

$$\begin{aligned}
 & (A+B) \otimes \delta\left(\xi + \frac{\xi_0}{2}, \eta\right) \\
 & + (A+O) \otimes \delta\left(\xi - \frac{\xi_0}{2}, \eta\right) \\
 & - A \otimes \left[\delta\left(\xi + \frac{\xi_0}{2}, \eta\right) + \delta\left(\xi - \frac{\xi_0}{2}, \eta\right) \right] \\
 & + B \otimes \delta\left(\xi + \frac{\xi_0}{2}, \eta\right) \\
 & + O \otimes \delta\left(\xi - \frac{\xi_0}{2}, \eta\right),
 \end{aligned} \tag{1}$$

where ξ, η are the coordinates of the film P in the plane.

After linear treatment, the film P exposed twice is placed on the front focal plane of the lens O_1 in the optical system shown in Figure 1. It is then illuminated by a parallel beam of laser. The amplitude of transmittance t can be written as

$$\begin{aligned}
 t = & a - bA \otimes \left[\delta\left(\xi + \frac{\xi_0}{2}, \eta\right) \right. \\
 & \left. + \delta\left(\xi - \frac{\xi_0}{2}, \eta\right) \right] \\
 & - bB \otimes \delta\left(\xi + \frac{\xi_0}{2}, \eta\right) \\
 & - bC \otimes \delta\left(\xi - \frac{\xi_0}{2}, \eta\right),
 \end{aligned} \tag{2}$$

where a, b are constants. Therefore, on the plane of frequency spectra (i.e., the rear focal plane of the lens O_1), the distribution of the amplitude should be proportional to the Fourier transform $\mathcal{F}\{t\}$ of t . From equation (2) we obtain:

$$\begin{aligned}
 \mathcal{F}\{t\} = & ab(u, v) - b[2\mathcal{F}\{A\} + \mathcal{F}\{B\} \\
 & + \mathcal{F}\{O\}] \cos\left(\frac{\pi u \xi_0}{\lambda}\right) \\
 & - ib[\mathcal{F}\{B\} - \mathcal{F}\{O\}] \sin\left(\frac{\pi u \xi_0}{\lambda}\right),
 \end{aligned} \tag{4}$$

where u, v are spatial frequencies. $\mathcal{F}\{A\}$, $\mathcal{F}\{B\}$ and $\mathcal{F}\{C\}$ respectively correspond to the frequency spectra of A, B and C . The first term on the right side of the equation corresponds to the bright speckle at the center of the focal point of the lens O_1 , i.e., the geometric image of the light source which

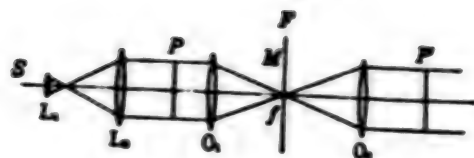


Figure 1. Optical Information Processing System To Detect the Differences Between Two Photographs

Key: S--laser source;
P--photographs being scrutinized;
P'--conjugate plane of P;
L₁, L₂--collimation system;
O₁, O₂--transformation lens;
F--common focal plane of O₁, O₂;
M--filter of Young's fringes.

does not include the frequency spectra of the two photographic images. The second and third terms on the right side of the equation are equivalent to the frequency spectra modulated by two sets of complimentary Young's interference fringes.

Let us now consider the following two cases:

1. If the two photographs are entirely the same, for example, photographs of the same set of white light, then $B = 0$, $C = 0$, the third term on the right side of equation (4) does not occur, therefore Young's fringes corresponding to the second term is the clearest. Like the ordinary method, the directions of relative displacement of the direction of the fringes and the image of the fringes are perpendicular to each other, the space between the fringes and the amount of relative displacement of the image are inversely proportional.
2. By placing a narrow spatial wave filter to allow the smallest part of the fringes to pass, we obtain a frequency spectrum after filtering written as follows

$$-b[\mathcal{F}\{B\} - \mathcal{F}\{C\}].$$

Then we perform an inverse transform through the lens O₂ and we obtain the difference $|B - C|$ between the two different parts of the two photographs on the P' plane.

If the second photograph is a part of the first photograph, i.e., $C = 0$, then the difference B between the two photographs can be obtained on the plane P'.

In Figure 3, (a) and (b) were photographs of a certain region taken by the satellite (one of the photographs had been processed) used to simulate two images taken at different times. (c) is the difference between the two

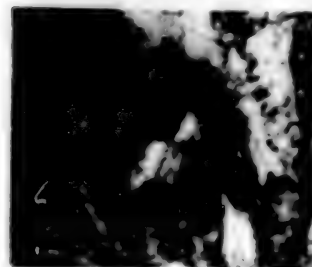
Figure 2. Photograph of the Actual Experimental Setup.



图2 实际的实验装置照片

Figure 3. Satellite Photographs and the Photograph of the Difference Detected

The bright spot shown in (c) indicates the difference between (a) and (b)



(a)



(b)



(c)

photographs obtained by frequency spectral wave filtering and inverse transformation. Because the wave filter used in the experiment was not ideal enough, the frequency spectra of a very small area still passed through but the difference between (a) and (b) can still be clearly seen.

Worth careful notice in the experimental installation is the precise positioning of the photographs to be scrutinized and the control of appropriate displacement to produce Young's fringes which can be conveniently filtered. The selection of the collimating lens and the Fourier transform lens that produce the parallel light beam in the optical system for information processing are also worth attention. To assure the quality of the resulting photographs, the

parallel light beam must be even, the diameter of the light beam must satisfy the demands of the dimensions of the photographs being scrutinized so that a diffracted image caused by dust must be eliminated as much as possible. The transformation lens should be a perfect lens that eliminates aberration. And $f_1 = f_2 = 1,000$ is ideal. In our experiment, because the lens used for the Fourier transform was not ideal enough, therefore aberration still occurred in the results.

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CSO: 8111/072

APPLIED SCIENCES

BRIEFS

AUTO BEARINGS ENTERPRISE MANAGEMENT SEMINAR--A national management seminar of automobile bearings enterprises under the First Ministry of Machinebuilding was held at the First Motor Vehicle Plant in Changchun from 16 to 22 July 1981. Leaders of 31 key factories in the automobile bearings trade, 25 factories in other trades under the First Ministry of Machinebuilding, and concerned bureaus under the First Ministry of Machinebuilding, totaling more than 120 persons, attended the meeting. Minister Rao Bin spoke at the seminar. The meeting primarily exchanged experiences in enterprise management and studied ways and means to raise the level of enterprise management, improve business administration, raise economic results, and make still greater contributions to the Four Modernization Program. At the meeting, representatives from the First and Second Motor Vehicle Plants, Beijing Motor Vehicle Plant No 2, Changsha Automobile Electrical Equipment Plant, Harbin Gear Plant, Nanjing Machine Tool Plant No 2, and the Shanghai Pengpu Machinery and Equipment Plant exchanged experiences in enterprise management. They also visited the First Motor Vehicle Plant and held extensive discussions. [Beijing QICHE JISHU [AUTOMOBILE TECHNOLOGY] in Chinese No 9, 1981, Inside Front Cover]

LASER OPTICAL FIBER TELEPHONES--Beijing's first laser fiber optics telephone communications testing system began serving daily telephone calls on 23 February of this year. For 5 months, it has been operating 24 hours a day and the system has not been interrupted, the telephone sound is clear and loud, and the users are satisfied. Laser optical fiber telephone communications is a telecommunications technology that developed during the 1970's. The optical fiber telephone involves the use of light waves to replace electrical waves and transmitting information through a glass fiber. A glass fiber thinner than a human hair can handle up to 10 million ordinary telephone line conversations, the properties are reliable, the ability to resist interference is strong, the quality of sound is good, the secrecy is good, and the use of optical fibers conserves copper materials. In recent years, this new technology is being researched and developed competitively internationally, but at present, only a few nations have reached the level of applicability. [Text] [Beijing RENMIN RIBAO in Chinese 6 Aug 81 p 3] 9296

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[Text] Adsorption from Solutions. V. Adsorption of Benzoic Acid from Mixed Solvents of Carbon Tetrachloride, Benzene and Ethyl Alcohol by Sugar Charcoal and Silica Gel.....Zhang Zhijing [1728 0037 2490], Chemistry Laboratory, Beijing Aeronautics; Gu Tiren [7357 1912 0086], Department of Chemistry, Beijing University (287)

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The Microenvironmental Effects of the Helical Conformations of Amylose and Its Derivatives. 1. The Inclusion of the Substrates Carrying a Hydrophobic Long Hydrocarbon Chain with Sodium Carboxymethylamylose as the Host.....Hui Yongzheng [1920 3057 2973] and Gu Jianhua [7357 1696 5478], both of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (309)

The Crystal Structure of Ag_2ClNO_3Zhou Gongdu [0719 0361 1653] and Wu Bomu [0124 0130 3668], both of the Department of Chemistry, Beijing University (319)

Spectrophotometric Study of the Reaction of m240-Tetra-(3-N-methylpyridyl) Porphyrin with Lead.....Tong Shenyang [4547 3088 7122], Wang Lianyou [3769 6647 0645] and Fan Jie [2868 2638], all of the Department of Chemistry, Beijing University (327)

Quantitative Analysis of Inseparable Peaks in ChromatographyHuang Junxiong [7806 7486 7160], Liu Xiufen [0491 4423 5358] and Liu Peng [0491 7720], all of the Institute of Environmental Chemistry, Chinese Academy of Sciences, Beijing (335)

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Studies of Color Reactions of Polycomponent Complex I. Rare-earth Ions-Chromazurol S-1, 10-Phenanthroline-cetyl-trimethyl

Ammonium Bromide System.....Ci Yunxiang [1964 0061 4382], Beijing University; Hu Keren [5170 0668 0086], Liu Zhonghua [0491 1813 5478] and Wen Lijian [2429 0500 1696], all of Beijing Institute of Rare-earth Metals (341)

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Synthesis of Perfluoro-2-methyl-3-oxa-glutaric Acid and Its Derivatives.....Ma Jingji [7456 2417 7535], Xu Yishuang [1776 0110 7208], Wang Jiusi [3769 0046 1835] and Huang Yaozeng [7806 5069 2582], all of the Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (354)

The Synthesis of a Prostaglandin Intermediate--2-(6'-Methoxycarbonylhexyl)-cyclopent-2-en-1-one.....Liu Zhiyu [0491 1807 3558] and Han Weiping [7281 5898 1627], both of the Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (358)

Theoretical Examinations of Ligand Buffer Solutions..... Zhao Zaofan [6392 5679 5672], Chemistry Department, Wuhan University (362)

Studies on Analysis of Metabolites of Pesticides. II. Isolation and TLC of 5-Chloroanthranilic Acid in Urine.....Du Xiguang [2629 6932 0342] and Li Dingjun [2621 1353 0193], both of Zhejiang Medical College, Hangzhou; Mao Zhixiang [3029 1807 5046], Liu Zhijiang [0491 1807 1730], et al., all of the Pesticide Laboratory, Zhejiang Medical College, Hangzhou (367)

Stability Constants and Molar Extinction Coefficients of $[\text{Fe}(\text{SCN})_n]^{3-n}$ Complexes in 25 percent Alcohol (v/v) Solution at 0°C.....Chen Lianshan [7115 6647 1472] and Zhao Honggang [6392 3163 0474], both of the Department of Chemistry, Liaoning Teachers College, Dalian; He Zhonglin [0149 6945 2651], et al., Department of Chemical Engineering, Dalian College of Light Industry (371)

Communications

The Microenvironmental Effects of the Helical Conformations of Amylose and Its Derivatives. 2. Catalytic Effects of Sodium Carboxymethylamylose on the Hydrolysis of Various Carboxylic

Esters of *N*-Alkyl-3-hydroxypyridinium Iodide.....Hui Yong-
zheng [1920 3057 2973], Gu Jianhua [7357 1696 5478] and
Jiang Xikui [5592 6932 1117], all of Shanghai Institute of
Organic Chemistry, Chinese Academy of Sciences

(376)

9717

CSO: 4008/9

CONFERENCE HELD ON RADIOACTIVE ENVIRONMENTS IN MINES

Hong Kong ZHONGGUO XINWEN in Chinese 14 Jul 81 p 3

["China's Research into Radioactive Environments in Mines Progresses"]

[Text] Beijing, 13 July--Researchers into radioactive environments in mines have launched massive scientific research in uranium mines and mines with associated radioactive minerals and have realized outstanding results.

The first national academic discussion conference on radioactive environments in mines was held in Beijing at the end of June and the beginning of July. It received 103 papers which show that China's scientific research into radioactive environments in mines has achieved welcome progress in the following four aspects:

The problem of ventilation to exhaust radon and the problem of controlling radioactive pollution in uranium pits and non-uranium pits of different types have been solved, and comprehensive measures have been developed which are suitable for the actual situation in China for ventilation, sealing and control of radon which has separated out. In particular, the method of pressurized ventilation has been used: under a reduction of two-thirds in the amount of air, the concentration of radon was lowered by over 90 percent.

Some new methods and instruments to monitor and measure radon have been developed. The quick radon measurement by balloon has already been widely popularized and applied.

A group of new types of coating materials to guard against radon have been developed. Plastic for preventing radon from separating out has an efficiency of over 83 percent.

Profound exploration has been conducted into the cause of occupational diseases in mines. The viewpoint of a compound effect of such harmful substances as radon and arsenic upon the human body has been proposed. It has great practical meaning and theoretical value.

One hundred and eleven scientific and technical workers attended this academic discussion meeting. The director of the Chinese Nuclear Society and vice minister of the Second Ministry of Machine Building, Wang Ganchang [3769 3227 2490], came to the meeting and spoke.

Architecture

AUTHOR: MO Bozhi [5459 0130 3112]
et al.

ORG: None

TITLE: "Tourists' Hotels with Courtyards"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 9, 1981
pp 1-8

TEXT OF ENGLISH ABSTRACT: This article treats small hotels for tourists with courtyards built in Guangdong in recent years with respect to the following points:

1. In addition of meeting the general requirements, different functional components of these hotels are arranged according to the principles of landscape gardening. Four types of arrangements are mentioned in the article.
2. Circulation in these hotels is considered to give variation in vistas to give more enjoyment to the tourists.
3. Elements smaller in mass are more appropriate for forming architectural combinations with emphasis on the character of each.

AUTHOR: WAN Zhongying [8001 6945 5391]
et al.

ORG: None

TITLE: "Refreshment Pavilions in Scenic Spots"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 9, 1981
pp 9-16

TEXT OF ENGLISH ABSTRACT: Buildings serving refreshments in scenic spots and parks should add interest to the scenery in addition to meeting the physical requirements. The location of these buildings should be considered in the planning of the scenic spot as a whole and the form treated as a center of interest. The characteristics of the natural environment should be taken advantage of. As the number of visitors varies considerably in different seasons, flexibility in the serving facilities should be noted. Particular local colors should be emphasized in the architectural treatments.

AUTHOR: ZHENG Zuliang [6774 4371 5328]
et al.

ORG: None

TITLE: "Refreshment Compounds in Cultural Park, Guangzhou"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 9, 1981
pp 24-28

TEXT OF ENGLISH ABSTRACT: The ground floor of a four-storied exhibition building in the Cultural Park, Guangzhou, is used for refreshment compounds, reception rooms, etc. The space is designed with culture as the leitmotif in accordance with the character of the park. In the treatment of the interior, principles of both Chinese traditional and foreign landscaping arts are applied with sculptural decorations and effects. The space is subdivided with variations in atmosphere and rhythm in modulation. Care has been taken to intermingle the indoor and outdoor spaces.

AUTHOR: LU Yuanding [7120 0337 7844]
et al.

ORG: None

TITLE: "Local Dwellings in Guangdong"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 9, 1981
pp 29-36

TEXT OF ENGLISH ABSTRACT: Traditional experiences in local dwellings in Guangdong are investigated and analyzed by the authors. With the basic element of planned one-bay, two-bay or three-bay arrangement, various combinations can be formed either by longitudinal or transversal extensions. The arrangement of the houses in the village usually follows a comb-shaped pattern, with the main alley in the direction of the summer winds. Pools are provided in the front and trees planted on the other sides. Ventilation and shading have been the main considerations. The hall is the main living space in the dwelling, which is usually open or partly open to the court. The disposition of the hall and court is centered around efficient ventilation and heat insulation. In addition to the function of lighting, ventilation and sewage, the court also aids in a better environment. Utilization of the terrain and treatment of details are also reviewed in the article.

AUTHOR: SHE Junnan [0152 3975 0589]

ORG: None

TITLE: "Enhancing the Level of Design"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 9, 1981
pp 46-48

TEXT OF ENGLISH ABSTRACT: The author proposes the following points to enhance the level of architectural design. Architects should specialize mainly according to types of buildings in view of training specialists, hastening the design process and enhancing the quality of design. Architects should grasp technical knowledge as well as dialectics, especially in proceeding from reality, singling out the principal contradictions and emphasizing the unity of the design as a whole. Efforts should be made in imagination and creation based on the function, material, economy, terrain and other factors, reflecting them instead of stereotyping.

9717

CSO: 4009/64

Construction Engineering

AUTHOR: QIAN Huanbin [6929 3562 6333]
FANG Xuechu [2455 7185 2806]

ORG: QIAN of Design Academy No 4, Ministry of Chemical Engineering; FANG of Hubei Provincial Chemical Fertilizer Plant

TITLE: "Verification and Treatment of Foundations of Expansive Soil"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 5, 22 Sep 81
pp 43 - 47

ABSTRACT: The Hubei Chemical Fertilizer Plant is a large scale chemical fertilizer installation imported from the USA and Holland, having a modernized level of production of the 70's. The foundation of all the equipment components, such as pipes, instruments, the high speed compressor, the conversion furnace, etc. all require the settling to be absolutely less than 5mm. According to the data supplied by the Hubei Comprehensive Surveying Academy and the relatively complete geological surveying information, the location of the plant belongs to a region of expansion and contraction clay soil, and mainly contracting. Based upon the principle of individualized treatment, using locally available materials, the Design Academy No 4 of the Ministry of Chemical Engineering proposed a series of measures, including laying a cushion of sand, excavating all or some of the expansive and contracting soil and replacing it with nonexpansive soil or gravel, burying the foundation to a depth

[continuation of GONGCHENG KANCHA No 5, 81 pp 43-47]

of 1.5 to 2.5 m, adopting the technique of pressure counteraction, driving piers and adding beams to reduce contact between the foundation and the soil, using piles to transfer the structural load from the upper layer unstable soil to the stable soil of the lower layer, etc. A separate section of the paper, written by FANG, describes considerations in the arrangement of the various parts of the plant and their respective foundation treatment measures. Finally, FANG offers some suggestions in the place of the current practice of mainly using deep foundation and sand cushioning, which he believes to be not the optimal solution to the problem of expansive soil due to the increase in the cost of engineering and construction and the prolonged construction time.

6168

CSO: 4009/86

Construction Materials

AUTHOR: HOU Baorong [0230 1405 2837]
HE Shijian [0149 1102 0313]

ORG: None

TITLE: "Homogenizing Tank of the Mixing Chamber"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 9, 10 Sep 81 pp 2-7

ABSTRACT: Homogeneity of the raw material directly affects the productivity, quality of products, heat consumption, and the wear of refractories of the dry method rotary kiln or the standing kiln. In order to improve the raw material homogenizing technique of China's dry method cement plants, the Handan Design Institute of Cement Industry began in 1977 to study the design of a continuous homogenizing tank. With the assistance of Xuzhou Bureau of Mines Cement Plant, a model experiment of a homogenizing tank of the mixing chamber ($\phi 1.5 \times 2.5$ m) was completed early 1978. From Oct 78 to Jul 80, the 2 organizations jointly completed 2 industrial experiments of the homogenizing tank of the mixing chamber ($\phi 10 \times 20.5$ m) to produce a relatively satisfactory homogenizing effect and various design parameters. In Sep 80 the Ministry of Construction Materials approved the results and permitted the design to be domestically extended. To date, more than 20 domestic cement plants have decided to adopt it and some of them have started to construct theirs. The work process, the structure, and the major installations are described.

AUTHOR: LIU Binwen [0491 2430 2429]

ORG: Experimental Laboratory, Xinjiang Weiwei Autonomous Region First Construction Company

TITLE: "Property of Silicate Mixed Cement and Its Application in Construction"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 9, 10 Sep 81 pp 14-15, 9

ABSTRACT: Before 1963, the Xinjiang Cement Plant used 20-30 percent shale as the admixture to produce the No 400 mixed cement. Since then, for the purpose of improving the property and increasing the productivity, 40-45 percent of slag and shale have been used to form a complex additive to produce the mixed silicate cement, in which 1/3 being activated material and 2/3 inactive material. In these 2 decades, on the average, the First Construction Company has been using about 8000 tons of this type of cement every year. It has been extensively used to mix concrete of lower than No 250 and as a mortar mix. In the process of using it, it has been discovered that this cement has the following special properties: (1) Satisfactory early and late stage strength development; (2) Sensitive to the water ratio; (3) Effect of adding other additives (such as lignin calcium sulfonate) relatively poorer than ordinary cement; (4) Requiring more water and easier to mix. Gravel ratio to make concrete with this cement and the interrelationship between the strength of the cement and that of the concrete are explained.

6168

CSO: 4009/83

Electronics

AUTHOR: LUO Jincheng [5012 7234 2052]

ORG: Shanghai Electric Meter Plant

TITLE: "SB802 Semiconductor Parameters Fast Testing Instrument"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 9, 20 Sep 81
pp 43-44

ABSTRACT: Ordinarily, about 5-10 parameters of a transistor must be tested; for small scale integrated circuit, there may be several tens. Several currently commonly used meters and graphic display instruments are of general purpose and low cost, but are also of low efficiency; only one parameter can be tested and read at one time. For the purpose of improving the testing efficiency, the Shanghai Electric Meter Plant designed the SB802 instrument. With a 9-inch television picture tube, it forms a display screen to produce the concrete data of more than 10 parameters of the semiconductor being tested so that all these parameters may be judged all at once. The instrument may also be used for graphic, instead of numerical, display to show in curves and waves the properties of the device being tested. The basic work theory and the major technical properties of the SB802 testing instrument are described.

AUTHOR: MA Yunjie [7456 0061 2638]

ORG: None

TITLE: "The CS-2 Ultrasonic Echo Depth Finder"

SOURCE: Shanghai DIANZI JISHU [ELECTRONIC TECHNOLOGY] in Chinese No 9, 20 Sep 81
p 8

ABSTRACT: Most recently, the Shanghai Ultrasonic Wave Instrument Plant succeeded in making the CS-2 ultrasonic echo depth finder. Intermediate integrated circuits and transistors made in China are used. When it is being operated, the ultrasound emitter, which is installed in the bottom of the ship, sends out ultrasonic wave perpendicularly toward the bottom of the water, and instantly, the depth of the water is shown on the display screen in numbers. The testing range of the instrument is 0.5 - 100 m and the precision is ± 1 percent and ± 0.1 m. In order that ships may navigate safely, the instrument is equipped with an automatic warning alarm. When the ship reaches points where the depth of the water is 0.5-3 m, the alarm is activated automatically.

6248

CSO: 4009/84

Engineering

AUTHOR: XU Min [1776 2404]
TONG Dechun [0157 1795 4783]
SHI Xizhi [0670 5045 2535]

ORG: All of Shanghai Jiaotong University

TITLE: "Digital Spectral Analysis of Electroencephalogram (EEG)"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 1-13

TEXT OF ENGLISH ABSTRACT: Preliminary work in investigating the EEG with digital spectral analysis methods (power spectrum and power spectrum array) is presented in this paper. The principles of digital analysis methods, mathematical explanation and effectiveness of application are described in examples of intracranial space-occupying lesion caused by tumor and sleep-process control.

AUTHOR: QIAN Miaogen [6929 5375 2704]

ORG: Shanghai Jiaotong University

TITLE: "The Aging Characteristics of Cu-2 percent Be-0.30 percent Ni Beryllium Bronze"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 15-28

TEXT OF ENGLISH ABSTRACT: This paper investigates the aging characteristics of Cu-2 percent Be-0.30 percent Ni beryllium bronze which is widely used in China, especially the effect of the aging temperature and quenching grain-size, on discontinuous precipitation of alloys mainly using the metallographic method. The research shows that discontinuous precipitation is obviously observed when this alloy is aged at 320°C, the degree of precipitation depending considerably on the aging temperature and quenching grain-size. Moreover, a comparison has been made between the quantitatively metallography-measured value and the hardness data, which suggests that it is advisable that the amounts of grain boundary reaction for Cu-2 percent Be-0.30 percent Ni alloy be controlled within the range of 3-8 percent when aging at 320°C. The results of the research may serve as the processing foundations in aging this alloy, and suggest possibilities for improving the technology of beryllium bronze production in China. Finally, the applications of the above theory are described with the top twist wire as an example.

AUTHOR: WANG Shoutai [3769 1108 3141]
LIU Junbi [0491 6874 3880]

ORG: Both of Shanghai Jiaotong University

TITLE: "The Investigation of Dependence of Electrical Properties of Ship Cable on Water Absorption"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 29-45

TEXT OF ENGLISH ABSTRACT: In general, ship cables are used in humid-thermal conditions. Therefore, the water absorption properties are a significant problem for the users and manufacturers of the cables. This paper starts with the analysis of the water absorbing mechanism of rubber and plastics, followed by inspection of water immersion extraction of insulation of various rubber-and-plastic-insulated ship cables, and the determination of insulation resistance, capacitance, dielectric loss angle and breakdown voltage after immersion in water. It has been found that the variation of electric properties of ship cables depends on two relative but opposing factors: water absorption and extraction, while the capacitances vary regularly with the time for which they are immersed in water, its correlation approaching that of water absorption, and the correlation in rubber is better than that in plastics. Finally, methods for improving dielectrical properties after immersion in water have been suggested.

AUTHOR: HUI Zhikui [1920 1807 1145]
WANG Ai [3769 5676]

ORG: Both of Shanghai Jiaotong University

TITLE: "A Method of Computer-aided Analysis of SC Network"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 47-56

TEXT OF ENGLISH ABSTRACT: In this paper, a discussion of the computer-aided analysis of the switched capacitor (SC) network is presented. The discussion, based on the method of Y. P. Tsividis, includes presenting an algorithm and formulating programs. The two programs formulated by the authors correspond to arbitrary inputs and piecewise-constant inputs. Finally two practical SC circuits are analyzed with the help of a computer and the computational results are found to be satisfactory.

AUTHOR: SHEN Jiazhen [3088 1367 2823]
FAN Zuyao [5400 4371 1031]

ORG: Both of Shanghai Jiaotong University

TITLE: "The Bearing Capacity of Tension Field in Sheared Web"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 57-73

TEXT OF ENGLISH ABSTRACT: This paper is chiefly concerned with the ultimate shear bearing capacity of steel plate girder web varying with flange rigidity and web slenderness and aspect ratio. Based on the experimental results of a series of model tests on girders, with reference to the existing formula of other countries, the author has suggested an ultimate stage model of web in shear and the conception of effective width of tension field, leading to the formula of the bearing capacity of tension field. The calculated value coincides with the actual case quite well.

AUTHOR: MA Zhiliang [7456 1807 5328]

ORG: Shanghai Jiaotong University

TITLE: "Relative Suitabilities of Wave Theories for Structural Analysis of a Semisubmersible Platform"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 75-81

TEXT OF ENGLISH ABSTRACT: It is necessary to select a more suitable wave theory applicable for calculation of a wave velocity field in which a semisubmersible platform operates when structural analysis of it has to be performed. Generally a semisubmersible platform operates in a sea area of middle or deep water and the primary wave theories are Airy theory and fifth order theory. According to these two theories, velocity field calculations were made for a great number of different combinations of wave parameters and the results were analyzed. It is considered that the Airy is more suitable for engineering purposes.

AUTHOR: LIN Jieren [2651 2638 0086]
TAN Jiahua [6223 1367 5478]
GU Mintong [7357 2404 4547]

ORG: All of Shanghai Jiaotong University

TITLE: "A Study of the Approach of Searching the Optimum Ship's Principal Elements"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 83-96

TEXT OF ENGLISH ABSTRACT: In this paper, the approach to searching the optimum new ship's principal elements with the aid of a computer is described. The authors are fully aware that to develop this new technique the reliability of evaluating results must be improved. Therefore, with the improvement of reliability as the key problem, suitable procedures and preliminary methods for analysis of the involved parameter's sensitivity and errors of the results are given, and a new form for expressing the results is recommended. In this last part of the paper, an example is given for brief illustration.

AUTHOR: GU Yongqing [7357 3057 3237]

ORG: Shanghai Jiaotong University

TITLE: "Research in Using X-rays to Measure the Residual Stresses Layer-by-layer in Grinding"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 97-106

TEXT OF ENGLISH ABSTRACT: This paper discusses the use of X-rays to measure residual stresses in grinding by using different metal targets and changing the angles of incidence in a special attachment. Using X-rays, it is possible to detect residual stresses in various penetration depths of the metal surfaces ground without etching the layers of the surfaces as the usual processes required. The method is particularly suitable for the grinding process because the gradient of residual stresses in grinding is very sharp. The fact that measuring results (compressive stress) do not correspond to the real condition (tensile stress) is explained. The various values measured by employing different metal targets to the same specimen are also explained.

AUTHOR: WANG Chengtao [3769 2052 3614]
LI Zhuguo [2621 2691 0948]
DAI Wei [2071 0251]
et al.

ORG: All of Shanghai Jiaotong University

TITLE: "The Study of Journal Center Path of Internal Combustion Engine Bearing"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 107-124

TEXT OF ENGLISH ABSTRACT: This paper discusses several methods of calculation of journal center path of the internal combustion engine bearing, of which Holland's method is described and studied in particular detail. Some data and symbols in calculating procedures of Holland's method have been corrected and a common computer program has been developed for designing bearings of the IC engine in China.

The method, the "Four Vectors Method," based on the study of Holland's method, is suggested for the first time. The results of its solution approach the results of the solution of Hahn's method. Although Hahn's method is more exact in calculating results, it requires longer time consumption with the computer. Holland's method and the Mobility method are simpler and therefore more practical, and both methods

[Continuation of SHANGHAI JIAOTONG DAXUE XUEBAO No 3, Aug 81 pp 107-124]

are widely used in practice. In addition, applications of the journal center path to designing of the IC engine and the actual measurement method of journal center path are introduced.

AUTHOR: FAN Yuanwu [2868 0337 2976]

ORG: Shanghai Jiaotong University

TITLE: "The Calculating Methods of the Internal Short-circuit Currents in 12-Pulse Rectifier Circuits"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 125-136

TEXT OF ENGLISH ABSTRACT: The 12-pulse rectifier circuits are very important rectifier circuits. This paper describes the calculating methods of the internal short-circuit currents in these rectifier circuits. The author has worked out part of the theory.

AUTHOR: HU Yuda [5170 3022 6671]

ORG: Shanghai Jiaotong University

TITLE: "Multi-objective Optimization Methods"

SOURCE: Shanghai SHANGHAI JIAOTONG DAXUE XUEBAO [JOURNAL OF SHANGHAI JIAOTONG UNIVERSITY] in Chinese No 3, Aug 81 pp 137-147

TEXT OF ENGLISH ABSTRACT: This paper introduces some useful multi-objective optimization methods.

9717

CSO: 4009/43

Lasers

AUTHOR: WANG Runwen [3769 3387 2429]
LEI Shizhan [7191 0099 3277]

ORG: Both of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Radiation Spectrum of Relativistic Electrons in a Spatially Periodic Transverse Magnetic Field"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 8, Aug 81 pp 1-4

TEXT OF ENGLISH ABSTRACT: The motion track of relativistic electrons in a spatially periodic transverse magnetic field has been analyzed. Under some conditions, the electron motion is harmonic in the direction perpendicular to the original incident one. Radiation spectrum and spectral width have been obtained using harmonic mode, and the nonharmonic one is also discussed. It has been shown that the radiation spectrum depends on the initial electron velocity and the intensity of the magnetic field.

AUTHOR: SUN Kun [1327 1024]
SONG Keliang [1347 0344 5328]
BAO Shanfei [0545 0810 2431]
LI Weijun [2621 4850 0689]
LIU Shaokui [0491 1421 1145]

ORG: SUN, SONG and BAO all of Jilin University of Technology; LI and LIU both of Jilin Diesel Engine Factory

TITLE: "Investigation of Drilling with False Concentric Resonator of Changeable Energy"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 8, Aug 81 pp 26-30

TEXT OF ENGLISH ABSTRACT: At present, plane parallel resonator is often used in multipulse laser drilling with average distribution of pulse energy. We consider it disadvantageous in regard to accuracy, surface finishing and reproducibility for the drilled holes. Through analysis and experiments on output characteristics of resonators as well as rational distribution of pulse energy, improvement in accuracy, surface finishing and reproducibility of the drilled holes can be achieved, especially in improving their taper, by using the false concentric resonator with changeable energy.

AUTHOR: ZHA Guigen [2686 6311 2704]
LI Xindi [2621 2450 1229]
QIAN Jianming [6929 0494 2494]

ORG: All of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Pulsed Xenon Flashlamps and Filter Envelopes Made of Quartz Tubes and Their Use in Lasers"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 8, Aug 81 pp 39-44

TEXT OF ENGLISH ABSTRACT: In pulsed flashlamps and filter envelopes made of quartz tubes with appropriate thickness and proper concentration of doped rare-earth elements, such as cerium, europium, etc., UV radiation below 3500 Å is essentially eliminated, thus filter solution and yellow glass filter envelopes in solid state lasers can be replaced and the coloring of the laser material is prevented.

A comparison has been made among filtering characteristics of different filter materials and their efficiencies in repetitive pulse Nd:YAG lasers. Experimental results show that using doped quartz in Nd:YAG laser and Nd:glass lasers, laser efficiency can be increased by 25-100 percent, or even more.

9717
CSO: 4009/65

Machine Tool Research

AUTHOR: WANG Kexi [3769 0344 6932]

ORG: Machine Tool Research Institute, First Ministry of Machines

TITLE: "Development of Electromachining in China and Its Effect on the National Economy"

SOURCE: Beijing JICHUANG [MACHINE TOOL] in Chinese No 9, Sep 81 pp 18-20

ABSTRACT: Electromachining means using electric energy directly to a workpiece to effect removal of material to produce the desired shape. Broadly speaking, it includes, aside the commonly known electric spark machining and electrolytic machining, it also includes electron beam, laser, plasma, ultrasonic, electromagnetic forming, etc. methods. At present, however, the most extensively applied, here and abroad, remains the electric spark and the electrolytic machining techniques, which have had a history of development in China of nearly 30 years. According to incomplete statistics, today there are about 15,000 electromachining tools of more than 30 types in China. Of these, forming and perforating tools number 8000; electrode cutting tools 6000; electric spark tools 300; electrolytic grinding machines 500; and electrolytic processing machines 200. The theory, procedure, applications, and structure of electric spark and electrolytic machining tools are described. At present, the cost of an electrolytic processing tool is very high (about 2 to 3 hundred thousand yuan to construct one) the power consumption is great, and the work process is difficult to master. Problems and prospects of future development are discussed.

6248

CSO: 4009/82

AUTHOR: LI Wenqing [2621 2429 3237]

ORG: Department of Mathematics

TITLE: "On the Controllability of Infinite Dimensional Linear Systems"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY] in Chinese Vol 20 No 3, 1981 pp 267-273

TEXT OF ENGLISH ABSTRACT: In this note, the following systems:

$$\dot{x} = Ax + Bu \quad x(0) = x_0 \quad (1)$$

$$\dot{x} = Ax + Bu + Cv \quad x(0) = x_0 \quad (2)$$

are discussed, where x denotes element of a Hilbert space H , A is a closed linear operator, u, v denote the elements of another Hilbert space H_C , which are control elements, $u(t), v(t) \in L_2(0, t_1; H_C)$, B and C are bounded operators: B is called control operator and C is called compensator operator. In this note the following problem is discussed: if the system (1) is not controllable, under what conditions is the system (2) controllable? The problem is solved in terms of a mild solution to (2) by the following equation

$$x(t) = T(t)x_0 + \int_0^t T(t-s)Bu(s)ds + \int_0^t T(t-s)Cv(s)ds \quad (3)$$

[Continuation of XIAMEN DAXUE XUEBAO Vol 20 No 3, 1981 pp 267-273]

where $T(t)$ is the semigroup generated by A . The following theorem holds.

Theorem: Let A be a closed operator, $T(t)$ the semigroup generated by A , $x(t) \in C(0, t, H)$, H be a Hilbert space, $u(s), v(s)$ belong to $L_2(0, t_1; H_C)$, H_C be another Hilbert space, and B and C be linear bounded operators. The necessary and sufficient condition for system (2) to be approximately controllable is that

$$\bigcup_{0 < t < t_1} R(T(t)B) + \bigcup_{0 < t < t_1} T(R(t)C)$$

is dense in the Hilbert space H , where $R(T(t)B)$, $R(T(t)C)$ represent the ranges of $T(t)B$, $T(t)C$ respectively.

In this note, the notions of the effective compensator and optimal compensator are discussed and two criteria are established.

AUTHOR: LUO Zhenhua [4382 2182 5478]

ORG: Department of Mathematics

TITLE: "The Distribution of the Random Flow Quantities in PERT"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 274-289

TEXT OF ENGLISH ABSTRACT: The distribution of the random flow quantities η of an event in PERT was studied by Grubbs, Donaldson, MacCrimmon and Ryavec with Beta distribution. However, in order to express the mean and standard deviation of this distribution by $E_{\eta} = 1/6(a + 4m + b)$ and $\sqrt{D_{\eta}} = 1/6(b - a)$, it is necessary and sufficient that $p = 3 \pm \sqrt{2}$, $q = 3 \pm \sqrt{2}$ or $p = q = 4$ in Beta density function $p(x) = \frac{(x-a)^{p-1}(b-x)^{q-1}}{(b-a)^{p+q-1}B(p,q)}$, where a , b and m are the optimistic, pessimistic and most likely estimation of the flow quantities, respectively. In this paper, a concentrated normal distribution function is introduced and the above-mentioned distribution of the random flow quantities in the sense of approximation is treated, whereby a set of the most likely flow quantities is obtained, which is required by the projectors of PERT.

AUTHOR: WANG Shitie [3769 1102 6993]

ORG: Department of Mathematics

TITLE: "The HOI Resolution and HOL Resolution in Horn Set"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 290-296

TEXT OF ENGLISH ABSTRACT: In this paper, the OI resolution in Horn Set, which is called the HOI resolution, is proved. It is not only complete for Horn base clauses set, but also complete for the set of general Horn clauses.

AUTHOR: CAI Jingqiu [5591 4842 3808]

ORG: Department of Mathematics

TITLE: "Negative Hyper Ordered Resolution Principle"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 297-304

TEXT OF ENGLISH ABSTRACT: In this paper, first the basic idea of the semantic resolution principle is discussed, then a new semantic resolution principle, the negative hyper ordered resolution, is introduced. In this new resolution, the interpretation I is restricted to the most natural form (i.e., no negative sign is contained in I), and the order of the predicates in the clause is defined by the ordered clause idea. This new resolution is complete in the first-order predicate calculation, but the familiar ordered resolution (OI-resolution) is not complete in the proposition calculation.

AUTHOR: LIU Ruitang [0491 3843 1016]
CHEN Zhenxiang [7115 2182 3276]
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ORG: All of the Department of Physics

TITLE: "Luminescent Properties of ZnS:Er^{3+} AC Electroluminescent Thin Film"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 305-311

TEXT OF ENGLISH ABSTRACT: In order to study the luminescent behavior of rare-earth impurities in ZnS, ZnS thin films doped with pure erbium metal were fabricated. The emission spectra, brightness-voltage characteristics and polarization effect of the films have been observed. It is of interest to note that although Er^{3+} are different in lattice environment, the structure of their spectra is nearly the same, whereas the relative peak values are different. The observed brightness-voltage relations and polarity phenomena support the point of view of impact excitation and polarization field effect. To explain the experimental results it is suggested that there are more than one kind of electron trap with different trap depths.

AUTHOR: JIANG Bingxi [3068 3521 3356]
ZHOU Bizhong [0719 1801 1813]
LIN Xiuhua [2651 4423 5478]

ORG: All of the Department of Physics

TITLE: "Investigation of the Specificities of Nitrogen-doped Epitaxial GaP Layers"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 312-319

TEXT OF ENGLISH ABSTRACT: An investigation has been made of the influence of growth conditions upon the morphology, growth rate, dislocation density, saucer pit density, nitrogen concentration and minority carrier lifetime of epitaxial GaP layers. It is shown that the nitrogen concentration and the minority carrier lifetime in the epilayer increase with increasing temperature of initiating growth. The nitrogen concentration in the epilayer grown at 1037-980°C using GaN or the nitrogen source was not increased beyond the level of $5.6 \times 10^{17} \text{cm}^{-3}$. In the epilayer grown at 995-900°C on the IEC GaP substrate ($\tau_m \approx 5 \text{ns}$), the minority carrier lifetime has been estimated to be $\sim 130 \text{ ns}$. The dislocation density does not vary and the saucer pit density decreases by a factor of 10 in the epilayer as compared with that in the substrate. The experimental results are analyzed.

AUTHOR: HONG Liangji [3163 5328 1015]
LIU Zhaohong [2692 0340 3163]

ORG: Both of the Department of Physics

TITLE: "Photovoltaic Effect of ZnS:Cu, Cl, Er DC Electroluminescent Thin Film"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 320-325

TEXT OF ENGLISH ABSTRACT: Some erbium-doped ZnS thin films exhibit both DC electroluminescence and photovoltaic effects. It was observed that there exist certain interesting relations between these two phenomena. Hence, the study of photovoltaic effects might be helpful in understanding the mechanism of electroluminescence.

AUTHOR: YU Naimei [0151 0035 2734]
LI Dee [2621 1795 1230]

ORG: Both of the Department of Chemistry

TITLE: "The Relationship between the Phase Structure and Properties of Polytetrafluoroethylene (PTFE) and Poly (p-hydroxybenzoate) (Ekonol) Blends"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY] in Chinese Vol 20 No 3, 1981 pp 326-336

TEXT OF ENGLISH ABSTRACT: In this paper, the variation of friction, wear, elongation of break, tensile strength and impact strength of the PTFE/Ekonol blends with composition is determined. A polarizing microscope and DTA are used to study the phase structure of the composite. Some regularities of the relationship between the structure and properties have been obtained. Under unlubricated conditions, a model of the wear mechanism and a relationship of the form,

$$\frac{W_1 h_{1c}}{d_{1c}} = 0.40 \left(\frac{W_1}{d_1} + \frac{W_2}{d_2} \right),$$

for calculating a minimum wear rate of the PTFE composite are proposed.

AUTHOR: LI Dee [2621 1795 1230]
ZHANG Jinliu [1728 6855 2692]

ORG: LI of the Department of Chemistry, Xiamen University; ZHANG of Vinylon Factory, Fujian

TITLE: "A Simple GPC Method Used in the Determination of the Polymerization Degree Distribution and the Fraction Concentration of PVAc and PVA"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY] in Chinese Vol 20 No 3, 1981 pp 337-346

TEXT OF ENGLISH ABSTRACT: The conditions of wavelengths, precipitation agents and the amount used, color developing agents and the amount used, concentration of polymers and reaction time in the turbidimetric and colorimetric methods were carefully studied. The results obtained were quite satisfactory in repeatability and reliability. This method can be used not only in the detection of the fraction concentration of PVAc and PVA, but can also be extended to use in the detection of the fraction concentration of other polymers.

AUTHOR: HUANG Huiliang [7806 2585 5328]
YANG Sunkai [2799 1327 2818]

ORG: Both of the Department of Chemistry

TITLE: "Rapid Polarograph Type 75-4B and Its Application"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 347-353

TEXT OF ENGLISH ABSTRACT: This is a new device for electrochemical analysis. Made up of integrated circuits, the apparatus is stable in quality. Apart from those properties common to all polarographs, it has the following outstanding features:

The apparatus is small, light, portable and durable. The power consumption is low. Electrolytic cell is in common use for both the two-electrode and three-electrode system. In addition, to eliminate the poisonous effect resulting from the use of large quantities of mercury, a mercury film electrode has been used as a substitute for the ordinary dropping mercury electrode. It is excellent in reproducibility. Thus the working condition is improved. It also allows for a wider range of concentration of the solute to be determined polarographically.

It is used to analyze micro amounts or traces of metal impurities detected in mineral materials, alloys, chemical products, chemical reagents, water, soils and medical compounds. It can also be used in electrochemical research work.

AUTHOR: WU Yudian [0702 3842 4551]
CHEN Cimei [7115 1964 5019]
CHEN Yuwang [7115 0060 2598]
et al.

ORG: All of the Department of Oceanography

TITLE: "Indicator of the Degree of Heavy Metal Pollution in Natural Aquatic Environment--Distribution Ratio of Heavy Metals in Different Phases of Sediment"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 354-361

TEXT OF ENGLISH ABSTRACT: Based on the geochemistry theory and data from our field observation of the transportation of heavy metals in aquatic environments, we suggest that the distribution ratio of heavy metals in different phases of sediment should be used as an indicator in evaluating the degree of heavy metal pollution in the natural aquatic environment.

Heavy metals in unpolluted aquatic environment were mainly distributed in the crystalline phases of the sediment, while in the polluted environment they were chiefly distributed in acid soluble and organic phases of the sediment. Sediment index q may be defined as follows:

$$q = \frac{\Delta F}{F^*} = \frac{F - F^*}{F^*} .$$

[Continuation of XIAMEN DAXUE XUEBAO Vol 20 No 3, 1981 pp 354-361]

We have studied and analyzed the distribution ratio of heavy metals in different phases of sediment of the Changjiang River estuary and the Yang River zone water of Guanting Reservoir, and made a comparative analysis of the data of investigation on the Amazon River and the Yukon River as well as the Hov River. As a result, we have confirmed the reliability of the indicator.

AUTHOR: LUO Huiming [5012 2585 2494]
HUANG Houzhe [7806 0624 0772]

ORG: LUO of the Department of Oceanography; HUANG of the Department of Biology

TITLE: "Preliminary Investigation of the Food Ingestion and Absorption of *Penaeus* Larvae (*Penaeus penicillatus* Alcock)"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY] in Chinese Vol 20 No 3, 1981 pp 362-372

TEXT OF ENGLISH ABSTRACT: The food ingestion and absorption of the zoea and mysis larvae of *Penaeus penicillatus* were investigated with ^{35}S (^{35}S -Methionine) labelling technique and the following results were obtained.

At zoea-I stage, *P. penicillatus* larva is a phytophagous feeder. The food habit begins to change during the zoea-II stage. At the zoea-III stage the animal is a mixfeeder, and when the animal emerges as mysis, it appears to be predatory.

Using labelled *Chaetoceros* sp. as foodstuff, it was found that the filtering rate of the zoea decreases with the raising of the diet density up to the level of 10^4 cells/ml, and remains at that level in raising the diet density still further. The feeding rate on *Chaetoceros* sp. and the predatory rate on the nauplius of *Artemia salina* increase with the raising of the diet density, and remain at that

[Continuation of XIAMEN DAXUE XUEBAO Vol 20 No 3, 1981 pp 362-372]

in increasing the density still further. For *Penaeus* larva, the utilizable proportion of the food decreases with the raising of the diet density, and remains at a lower level in further raising of the density.

The intensities of the ingestion and absorption increase markedly with the development of the larva. It seems that superfluous feeding may appear in diet density higher than the optimal level.

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ORG: XU of the Department of Oceanography, Xiamen University; ZHANG of the Third Institute of Oceanography, National Bureau of Oceanography

TITLE: "On the Hydromedusae from the Continental Shelf Waters of the Northern Part in the South China Sea"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY] in Chinese Vol 20 No 3, 1981 pp 373-382

TEXT OF ENGLISH ABSTRACT: In the present paper, samples of hydromedusae were collected monthly from the continental shelf of the northern part of the South China Sea (110-117°E, north of 18°30'N) during February 1978 to January 1979. A total of 690 plankton samples were analyzed and 64 species of hydromedusae were identified, of which 23 species belong to Anthomedusae, 26 to Leptomedusae, 1 to Limnomedusae, 9 to Trachymedusae and 5 to Narcomedusae.

All of the species identified are enumerated in this article. Of these, *Euphysilla pyramidata* Kramp, *Gotoea typica* Uchida, *Koellikerina octonemalis* Mayer, *Pandaeosis ikarii* Uchida, *Phialidium malayense* Kramp, *Cirrholovenia tetranema* Kramp, *Petasiella asymmetrica* Uchida, *Amphogona apicata* Kramp and *A. pusilla* Hartlaub are recorded for the first time from the China Sea. The principal morphological characteristics of the above species are described and illustrated.

AUTHOR: ZHOU Ji [0719 3444]
CHEN Xile [7115 0823 2867]

ORG: Both of the Research Office of Dialectics of Nature

TITLE: "On the Position of Anthropology in the System of Scientific Classification"

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 383-390

TEXT OF ENGLISH ABSTRACT: In this paper, we consider anthropology to be a large basic subject, a bridge passing from natural science to social science and a group of subjects including many branches, because the movement of mankind is one of the forms of basic material movement in the material world, the formation of the transition from nature to society. Therefore, anthropology occupies a considerable position in the system of modern scientific classification. It cannot be replaced by any others.

AUTHOR: WU Hanchen [0702 3352 5256]

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TITLE: "The Total Volume for the Set of Cosets $\{o^+\}$ "

SOURCE: Xiamen XIAMEN DAXUE XUEBAO [JOURNAL OF NATURAL SCIENCE, XIAMEN UNIVERSITY]
in Chinese Vol 20 No 3, 1981 pp 391-393

TEXT OF ENGLISH ABSTRACT: Let $\{o^+\}$ be the set of the left cosets of the real orthogonal group of determinant +1 with respect to its subgroup $[\pm 1, \dots, \pm 1]$. The author calculates the total volume of $\{o^+\}$ and obtains:

$$V\{o^+\} = \int \dots \int_{\{o^+\}} \{o^+\} = \pi^{\frac{n(n+1)}{2}} \frac{1 \cdot 3 \cdot 5 \dots (2n-3)}{1! 2! \dots (n-2)! \Gamma\left(\frac{n}{2}\right) \Gamma\left(\frac{n+1}{2}\right) \dots \Gamma\left(\frac{2n-1}{2}\right)}.$$

As an application of this result the author obtains the value of the following multiple integral:

$$\int \dots \int_{\substack{1 \leq \nu < \mu \leq n \\ \pi > \theta_1 > \dots > \theta_n > -\pi}} |e^{i\theta_\nu} - e^{i\theta_\mu}| d\theta_1 \dots d\theta_n =$$

[Continuation of XIAMEN DAXUE XUEBAO Vol 20 No 3, 1981 pp 391-393]

$$= 2^{\frac{n(n-1)}{2}} \frac{\Gamma\left(\frac{n}{2}\right) \Gamma\left(\frac{1}{2}\right) \Gamma\left(\frac{2}{2}\right) \Gamma\left(\frac{3}{2}\right) \cdots \Gamma\left(\frac{2n-1}{2}\right)}{\Gamma(n) 1! 3! 5! \cdots (2n-3)!}.$$

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CSO: 4009/48

Silicates

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TITLE: "Phase Relationship and Ionic Conduction of Li_4GeO_4 - Zn_2GeO_4 System"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 253-257

TEXT OF ENGLISH ABSTRACT: The phase relationship and ionic conduction of Li_4GeO_4 - Zn_2GeO_4 system, and the stability and synthesis of the intermediate phases were studied. Found in this system were the compound $\text{Li}_2\text{ZnGeO}_4$ and a solid solution $\text{Li}_{4-2x}\text{Zn}_x\text{GeO}_4$ with x in the latter range from 0.25 to 0.50. The solid solution, which has the composition of $\text{Li}_{1.4}\text{Zn}(\text{GeO}_4)_2$, has the highest conductivity. It also has a low sintering temperature and can be prepared with ease. However, $\text{Li}_{1.4}\text{Zn}(\text{GeO}_4)_2$ solid solution, being very sensitive to CO_2 and H_2O , is unstable in air.

AUTHOR: WEN Tinglian [3306 1694 8834]
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ORG: Both of the Shanghai Institute of Ceramics, Chinese Academy of Sciences

TITLE: "Effects of Sintering and Annealing on the Sodium Ion Conductivity and the Microstructure of β'' -alumina"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 258-264

TEXT OF ENGLISH ABSTRACT: In the processing of β'' -alumina ceramics, which have a starting composition of 9.6 percent Na_2O , 0.72 percent Li_2O , and 89.68 percent Al_2O_3 by weight, the effect of a temperature rise program on the ceramic densification was investigated. The effects of sintering and annealing schedule on the sodium ion conductivity and the microstructure of β'' -alumina ceramics were also studied. After a fast firing and holding at 1600°C for five minutes and then being subjected to a moderate annealing below 1510°C for four hours, almost fully converted β'' -alumina ceramics with density exceeding 98 percent of the theoretical value have been obtained. This has a relatively uniform microstructure with an average crystal size of $20\sim 30\mu\text{m}$. Its sodium ion resistivity is about $6.5\Omega\cdot\text{cm}$ at 350°C . A conductivity activation energy of 5.63 kcal/mol has been determined over the temperature range from $275\sim 420^\circ\text{C}$.

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TITLE: "Method and Program of Determination of Dielectric, Piezoelectric and Elastic Complex Coefficients Matrix of Piezoelectric Ceramics"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 265-275

TEXT OF ENGLISH ABSTRACT: The matrix of dielectric, piezoelectric and elastic complex coefficients of piezoelectric ceramics fully characterizes the electromechanical properties of piezoelectric ceramics. However, by traditional methods, such as the IRE standard method or IEC recommended method, such coefficients cannot be completely determined. A computer program by the iterative method based strictly on a theoretical formula has been designed to meet this purpose. All of the real and imaginary parts of the coefficients relevant to the electromechanical properties of piezoelectric ceramics have been successfully determined when the admittance values (or impedance values) were measured at three suitable frequency points on admittance loop (or impedance loop) for four standard resonators separately.

AUTHOR: LI Xiangting [2621 7449 1656]
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TITLE: "EPMA Study on Sodium Deposition in β -alumina"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 276-278

TEXT OF ENGLISH ABSTRACT: The sodium deposition in β -alumina ceramics has been investigated by means of EPMA which provided a method for combining the sodium deposition process with simultaneous analysis of the sodium content. Measurements performed on samples with or without conductive coating film showed that the sodium content at the points bombarded by electron beams increased with the time of bombardment. For the samples without conductive coating, the counting rates of NaK_{α} X-rays were higher and appeared to fluctuate. This phenomenon was explained as being caused by the charge that had accumulated at bombarded points, thus leading to a drift of the electron beam. The NaK_{α} counting rate curves during sodium deposition and the secondary electron image at the deposition point as well as the NaK_{α} X-ray scanning image at the surface of samples after sodium deposition are given.

AUTHOR: FAN Shiji [5400 0013 7456/6259]

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TITLE: "Precipitation Phase Changes in Single Crystal of Lead Molybdate"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 279-284

TEXT OF ENGLISH ABSTRACT: In the present paper, precipitation phase changes in single crystal of lead molybdate are being discussed for the first time. Morphology and space distribution of precipitated phases have been investigated. The typical precipitated phase was found to be of wafer-form (plate-shaped) consisting of a blue-green center with two transparent side flanks lying on the {101} face. The precipitation process under high temperatures first underwent three successive stages: by the order of scattering centers with sizes of some hundred or thousand Å, "spot-form" phases of 1 μm in size and the typical wafer-form phases. If subjected continuously to high temperatures, the more complex diffusion phase changes will take place. The precipitation process causes oriented reflection and scattering of the laser and small angle scattering and two-dimensional diffraction of X-rays. The chemical composition of the precipitated phase indicates it to be a metastable non-stoichiometric phase (particularly at its transparent region). The micromechanism of the precipitation phase changes in the single crystal of lead molybdate under high temperatures and is presumably envisaged to be as follows:

[Continuation of GUI SUANYAN XUEBAO Vol 9 No 2, Sep 81 pp 279-284]

The collection of Mo(O) vacancies and Pb interstitial ions on {101} lattice faces is followed by their diffusion along the a- or b-axis, and reoriented to form lead-rich and lead-poor "G-P" zones and, as a result, the precipitated phases grow gradually into typical wafer-form.

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et al.

ORG: HE, LIN and SU, et al., all of Shanghai Institute of Ceramics, Chinese Academy of Sciences; LI, GU and RONG all of Shanghai University of Science and Technology

TITLE: "Investigation of Growth of PbMoO_4 Single Crystals"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 9 No 2, Sep 81 pp 285-294

TEXT OF ENGLISH ABSTRACT: This work investigates the relationship between growth parameters and crystal quality.

One of the distinguishing features of this investigation is the use of cross examination method in which a mathematic treatment is used to arrange the order of examination and to process the experimental data. Another feature of this investigation is the highly reproducible growth conditions of the diameter obtained

[Continuation of GUISUANYAN XUEBAO Vol 9 No 2, Sep 81 pp 285-294]

by the use of the automatically controlled buoyance balance designed by the authors. Light transmission, birefringent gradient, divergency and S/N ratio of the transmitted light beam have been used to evaluate the crystal homogeneity because of their importance from the practical point of view. Among growth parameters, the batch composition has been found to play a decisive role in crystal quality. Secondary is the pulling rate. The effects of the temperature gradient and the rotating rate prove to be rather small.

By means of petrography and electron-probe microanalysis it has been affirmed that the crystalline particles of Pb_2MoO_7 appear to scatter in the crystal when the batch composition deviates from stoichiometry to PbO -rich region. On the other hand, if the composition deviates to a MoO_3 -rich region, partial supercooling of the melt takes place causing severe detriment to the crystal quality.

The authors succeeded in obtaining the optimum growth parameters for the growth of high quality single crystals, which have satisfactorily met the severe requirements of the acousto-optical deflectors and modulators.

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XU Xianyu [1776 0341 1342]
HAN Ren [7281 7282]
LIU Chongxi [0491 1504 3356]

ORG: LOU, XU and HAN all of Zhejiang University; LIU of the Changjiang Research Institute of Hydroelectric Power

TITLE: "On the Formation and Reaction of Ettringite in Slag Cement"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 295-301

TEXT OF ENGLISH ABSTRACT: From a comparison made on the formation, morphology, transformation, stability and expandability of ettringite ($3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot 32\text{H}_2\text{O}$) in the hydration and hardening between the gypsum slag cement and portland blast furnace slag cement, the authors have brought forward, in connection with the discussion on the mechanism of the activation of granulated blast furnace slag, a proportioning principle of preparing a non-shrinking or slightly expansive cement from portland cement clinker, slag and gypsum.

AUTHOR: WANG Yuji [3769 3768 0679]
YE Gongxin [5509 6300 2946]

ORG: WANG of Tongji University; YE of Hefei Cement Research Institute

TITLE: "A Study of the Mineral Phases of Oxygen Converter Slag and Their Cementitious Properties"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 302-308

TEXT OF ENGLISH ABSTRACT: Chemical composition, mineral constitution and properties of hydration of the oxygen converter slag were investigated by chemical analysis, petrographic technique, XRD, DTA and physical tests. The minerals identified are tricalcium silicate, dicalcium silicate and its phosphorus-containing solid solution, dicalcium ferrite, RO-phase, free lime and some amounts of aluminate, aluminoferrite, fluor apatite, fluorspar and metallic iron.

The quality of the slag was graded by its content of tricalcium silicate and free lime. When the steel slag has a content of tricalcium silicate >40 percent and free lime <3 percent, it can be ground with gypsum to produce qualified steel slag cement. Compressive strengths of 50-60 N/mm^2 and 30-40 N/mm^2 have been obtained from slags containing tricalcium silicate of 50-55 percent and 40-46 percent respectively.

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TITLE: "Mechanism of Action of Low Alkalinity Cement on Medium-alkali Glass Fibers"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 309-317

TEXT OF ENGLISH ABSTRACT: Based on previous research and in consideration of the invariant point with the lowest CaO concentration in the system $\text{CaO-Al}_2\text{O}_3\text{-CaSO}_4\text{-H}_2\text{O}$ and $\text{CaO-SiO}_2\text{-H}_2\text{O}$, a low alkalinity cement (having a low pH value) has been made which is only slightly corrosive on the glass fibers. SEM, XRD, DTA, acidimetric analysis and chemical analysis were employed in the study on the mechanism of its action. The following conclusions have been drawn: (1) The pH value of the liquid phase compatible with the cement hydration products containing ettringite, $\text{Al}(\text{OH})_3$, gel and gypsum is rather low; (2) the rate of attack of such cement on medium-alkali glass fibers is low, approximately that of gypsum slurry and water, and is only one-twentieth that of portland cement; (3) the durability of the medium-alkali

[Continuation of GUI SUANYAN XUEBAO Vol 9 No 2, Sep 81 pp 309-317]

glass fibers immersed in the low alkalinity cement slurry is superior to that of alkali resistant glass fibers in portland cement slurry under temperatures of 50°C , and the strength of alkali resistant glass fiber remains unchanged when immersed in the low alkalinity cement slurry for a duration of seven months; (4) the attack of the cement on glass fibers is essentially for a chemical action.

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et al.

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TITLE: "Use of Perovskite $\text{La}_{1-x}\text{Ca}_x\text{CrO}_3$ as Electrode Material for Zirconia Solid Electrolyte"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 318-322

TEXT OF ENGLISH ABSTRACT: This paper deals with the feasibility of CaO doped lanthanum chromate $\text{La}_{1-x}\text{Ca}_x\text{CrO}_3$ ($x = 0, 5 \text{ percent}, 10 \text{ percent}, 12 \text{ percent}$) as solid electrolyte to stabilize zirconia electrode. Electrical conductivity of lanthanum chromate has been studied in relation to the substitution of calcium ions for lanthanum in the crystal lattice as well as to the contraction of lattice dimensions. The compatibility of $\text{La}_{1-x}\text{Ca}_x\text{CrO}_3$ with calcia stabilized zirconia at high temperatures has also been investigated. The thermal expansion, mechanical strength and temperature stability of $\text{La}_{1-x}\text{Ca}_x\text{CrO}_3$ were determined and the distribution of elements at the interface of high temperature reaction between lanthanum chromate and zirconia was investigated by electron probe microanalyzer.

AUTHOR: JIANG Zhonghong [1203 0022 1347]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Some Aspects of Regions of Glass Formation and Devitrification of Glasses"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 323-339

TEXT OF ENGLISH ABSTRACT: Based on our experiments and some data in the literature, the relation between regions of glass formation and oxide compositions of two or three component systems of borate, silicate and phosphate are discussed.

Different oxides have different characteristics of glass formation. They may be classified into six types, i.e., the glass forming body NF, the intermediate body NI, and the network modifiers which include alkali oxide NM_1 , alkali earth oxide NM_2 , inert electron pair metal oxide NM_3 (such as PbO , Bi_2O_3 , etc.), and polyvalent oxide NM_4 . Such classification makes it possible to describe the contour of the glass formation regions of various unknown ternary systems. Contrary to the traditional concept, the most stable region of glass is not in the meta-acid compounds, but in the eutectics formed near these compounds. By means of thermodynamic theory, the locations of these eutectic points and the effect of phase separation by introducing the third component can be predicted.

[Continuation of GUISUANYAN XUEBAO Vol 9 No 2, Sep 81 pp 323-339]

Some proposals for improving the devitrification characteristics of a new type of optical glasses are presented.

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ORG: Both of the Cement Division, Research Institute of Building Materials

TITLE: "On the Recent Development of the Use of Gypsum in Cement Industry"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY]
in Chinese Vol 9 No 2, Sep 81 pp 340-347

TEXT OF ENGLISH ABSTRACT: The chemical mechanism of gypsum as a raw material in cement production is described. On this basis, cements with such characteristics as expansion, self-stressing, quick-setting, rapid-hardening and high strength are manufactured. Cements of the sulphoaluminate series, the fluorinoaluminate series, the alunite series, the sulphate-aluminate series, the sulphate series recently developed in China are being treated in detail. Certain technical requirements for the gypsum and the broad prospects of its use in the cement industry are emphasized.

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ORG: WANG Chengyu of Dalian Institute of Light Industry; WANG Jiafan of Tianjin Ninth Glass Factory

TITLE: "A Study of the Devitrification of Silica Glass Tube in the Diffusion Furnace"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 9 No 2, Sep 81 pp 348-352

TEXT OF ENGLISH ABSTRACT: The optical microscope, scanning electron microscope, infrared absorption spectra, X-ray powder diffraction and chemical analysis have been employed in the investigation of devitrification of silica glass between 1080-1200°C. The crystalline phase identified is α -cristobalite, and the maximum rate of crystal growth is 0.375 μm per hour at 1200°C. The crystallization temperature is lower than that of high-purity silica glass as impurity in the diffusion furnace may cause the lowering of the crystallization temperature. Various factors affecting the crystallization are discussed.

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TITLE: "Calculation of the Phase Compositions of AZS Materials"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE CHINESE SILICATE SOCIETY] in Chinese Vol 9 No 2, Sep 81 pp 353-360

TEXT OF ENGLISH ABSTRACT: In this article, a general method and set of formulas for calculating the phase compositions of AZS materials from their chemical analyses are suggested. The results show that the calculated and observed phase compositions are generally in good agreement.

9717
CSO: 4009/50

Technical Standards

AUTHOR: YAO Shiquan [1202 0013 0356]

ORG: None

TITLE: "National Radio Interference Standardization Work Group Officially Established"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 5, 81 pp 11-12

ABSTRACT: Under the auspice of the National Bureau of Standards, and with the participation of the First Ministry of Machines, the Fourth Ministry of Machines, the Ministry of Post and Telecommunications, the Ministry of Light Industry, the Central Bureau of Broadcasting Industry, and the National Bureau of Metrology, the National Radio Interference Standardization Work Group was officially established on 23 Apr in Beijing, and the First Ministry of Machines and the Central Bureau of Broadcasting Industry were selected to take charge of the group. The delegates acknowledged the fact that due to lack of overall control and management, radio interference has produced serious effects on the nation and the people, to cause electromagnetic pollution to be one of the 4 common pests in some regions. Its effects on the monitoring and automation systems of communication, defense, and production departments are becoming more extensive and profound everyday. At the same time, due to strict standards of foreign countries on radio interference, machines and electrical products

[continuation of JISHU BIAOZHUN TONGBAO No 5, 81 pp 11-12]

no longer meet the requirements of international markets. The newly established work group suggests that in principle and as much as possible, the national standards should be formulated in accordance with the recommended standards of the CISPR of IEC. The national standardization plan discussed includes the methods of testing and the maximum permissible level of radio interference property of industrial, scientific, and medical high frequency equipment, the interference resistant property test and the degree of anti-interference of audio and video receivers, and the method of testing the radio interference property and the maximum permissible level of internal combustion engines, the ignition system of motorized vehicles, etc.

AUTHOR: XU Wen [1776 5113]

ORG: None

TITLE: "National Energy Supply Bases and Management Standardization Technology Committee Established in Beijing"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 5, 81 p 12

ABSTRACT: A meeting was called in Beijing on 16-17 May 81 for the establishment of the National Energy Sources and Management Standardization Technology Committee. It was chaired by DAI Hesheng [2071 5440 3932] of the Comprehensive Research Institute of Standardization of the National Bureau of Standards. The newly established committee is composed of 28 members, with China's famous engineering thermophysicist WU Zhonghua [0702 0112 5478] as the chairman. The major responsibility of the committee is to study and propose policies of China's energy source bases and management standardization, to organize the formulation of national energy sources bases and management standards, and to carry out revision, review, propaganda, and implementation work. Following considerable discussion, a brief rule of work of the committee and the work plan of 1981-82 were agreed upon. The delegates listened and discussed the national standards of heat energy units, symbols, and conversions, the heat equipment energy equilibrium principle, the equipment thermal efficiency calculation principle, and the comprehensive energy consumption calculation principle. Finally, it was resolved that a second meeting of the entire committee will be held in Shanghai during the Spring Festival time.

AUTHOR: SHI Baoquan [4258 0202 5425]
FAN Chenyi [5400 2110 0034]

ORG: Both of Mechanical Equipment Division, National Bureau of Standards

TITLE: "An Expanded Membership Meeting of the National Vacuum Technology Standardization Technology Committee Held in Huangshan"

SOURCE: Beijing JISHU BIAOZHUN TONGBAO [TECHNICAL STANDARDS BULLETIN] in Chinese No 5, 81 p 13

ABSTRACT: The expanded membership meeting of the National Vacuum Technology Standardization Committee was held in Huangshan of Anhui on 7-12 May 81, being the second meeting since last year's conference to establish the committee. The document, Terms and Terminology of Vacuum Technology, drafted by Shenyang Research Institute of Vacuum Technology was reviewed. Vacuum technology is new in China but it has developed into a complete field and applied in petroleum, chemical engineering, metallurgy, electronics, defense, etc, but there are yet no related national standards. The national standard of terms and terminology is a much needed first step toward standardization of vacuum technology. Based upon the opinions suggested by the delegates at the meeting, the Shenyang Research Institute will reorder the draft and mail it to related units and specialists to solicit suggestions and to prepare for its approval by the 1981 Annual Conference of the Technology Committee.

6168

CSO: 4009/87

Underground Engineering

AUTHOR: TAO Zhenyu [7118 2182 1342]

ORG: None

TITLE: "On the Problem of Rock Mechanics in Current Development of Hydroelectricity in China"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 9, 81 pp 1-4

ABSTRACT: Hydroelectricity occupies an extremely important part in China's development and utilization of energy resources, yet in order to accelerate its development, many key problems of science and technology are in need of resolving and one of these is the problem of rock mechanics. According to the most recent statistics, China's hydroelectrical reserve, distributed mostly to the west of the Beijing-Guangzhou line, is 68,000Mw and only about 2.36 percent has been developed to date. About 60 percent of this reserve is concentrated in the 3 provinces of Xizang, Sichuan, and Yunnan, where only 0.4 percent of it has been developed. Geographically speaking, therefore, the key region of future hydroelectrical development is where China's high intensity seismic region is. The complex geological and geomorphological conditions of the region will necessitate greatly increased underground engineering and from the view point of rock mechanics, the problems will involve the initial stress of rocks, the influences of ground temperature, characteristics of the seismic rock medium, and the stability of rocky slopes. New breakthroughs are obviously needed to obtain satisfactory resolutions to these problems.

AUTHOR: ZHU Keshan [2612 0668 6365]
XU Sishu [1776 1835 3219]

ORG: None

TITLE: "Applications of Underground Caverns in Chongqing"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 9, 81 pp 17-22

ABSTRACT: Chongqing is located at the point of convergence of the 2 rivers of Jialing and Changjiang. Within the urban area, the terrain is highly undulated while the division by the 2 rivers further aggravates the problem of lack of space. From the point of view of city planning and according to domestic and foreign experiences, there are 2 possible solutions: to build either high-rises or underground structures. Judging from material requirements, energy consumption, and construction cost, underground development is the more promising of the two. For this reason, Chongqing has had more than 40 years of history of underground construction. For the purpose of saving above ground space, underground structures of the Sichuan Provincial Ship Repair Plant, the lounge of the public transportation station No 1, the Chongqing Municipal Watch and Clock Company, etc. have been built and in use for years. There are also the Dabanqiao Underground Meat Cold Storage, the fruit and vegetable warehouses, and the underground granary for utilizing the thermal stability and airtightness of underground caverns. The 51 Movie Theater and the Chongqing Tobacco Plant have underground tunnel ventilation. These structures are described. Numerous photos of these structures are included.

AUTHOR: None

ORG: Zhenjiang Municipal Civil Defense Office; Zhenjiang Municipal Bureau of Grains

TITLE: "A Survey of the Condition of Grain Stored in Guanping Underground Granary of Zhenjiang City"

SOURCE: Chongqing DIXIA GONGCHENG [UNDERGROUND ENGINEERING] in Chinese No 9, 81 pp 22-23

ABSTRACT: Based upon the needs of war preparation, the Zhenjiang Bureau of Grains began to build the Guanping Underground Granary in the southern suburb of the city in 1973. It was completed 3 years later. It has an area of 1343 m² and a capacity of storing 2.60 million jin of grain. Since its completion, 8 types of foods, including grain, processed food, edible oil, potatoes, etc. totaling 5.03 million jin of foods have been alternately stored. The nutritional quality and the condition of change of the 10 thousand jin of Xian rice and 1.17 million jin of wheat have been compared with identical types stored in surface warehouses. Major advantages of the underground storage are found to be low temperature, dryness, airtightness, and low cost. Multiplication of pests and microorganisms is found to be under control and quality deterioration of the grains is found to be delayed. Details of these and other findings of the survey and comparative testing are discussed.

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